

03050201-050

(Cooper River)

General Description

Watershed 03050201-050 is located in Berkeley and Charleston Counties and consists primarily of the *Cooper River* and its tributaries. The watershed occupies 50,518 acres of the Lower Coastal Plain and Coastal Zone regions of South Carolina. The predominant soil types consist of an association of the Bohicket-Chipley-Leon-Capers series. The erodibility of the soil (K) averages 0.17; the slope of the terrain averages 1%, with a range of 0-2%. Land use/land cover in the watershed includes: 29.3% forested land, 24.8% urban land, 19.6% water, 16.5% forested wetland, 4.6% nonforested wetland, 3.5% scrub/shrub land, 1.1% agricultural land, and 0.6% barren land.

The Cooper River is formed at "The Tee" by the confluence of the West Branch Cooper River and the East Branch Cooper River and flows past the City of Charleston and into the Charleston Harbor. En route to the Charleston Harbor, the Cooper River accepts drainage from Tidal Creek, Grove Creek (Little Johnson Creek), the Back River watershed (03050201-060), Flag Creek (Pepper Gully), Slack Reach, Yellow House Creek, the Goose Creek watershed (03050201-070), Filbin Creek, Noisette Creek, Clouter Creek, Shipyard Creek, Newmarket Creek, and the Wando River watershed (03050201-080). There are several recreational ponds (10-40 acres) in the watershed. There are a total of 58.8 stream miles and 17.2 square miles of estuarine areas, all classified SB. Other natural resources in this watershed include the Francis Marion National Forest near the Flag Creek headwaters and Cypress Gardens.

Water Quality

<u>Station #</u>	<u>Type</u>	<u>Class</u>	<u>Description</u>
MD-043	P	SB	COOPER RIVER AT CHANNEL MARKER 72 NEAR USN AMMO DEPOT
MD-044	P	SB	COOPER R. BELOW MOUTH OF GOOSE CK AT CHANNEL BUOY 60
MD-249	P	SB	FILBIN CREEK AT VIRGINIA AVE, NORTH CHARLESTON
MD-248	P	SB	COOPER RIVER AT MARK CLARK BRIDGE (I-526)
MD-045	P	SB	COOPER RIVER UPSTREAM OF SHIPYARD CK AT CHANNEL BUOY 49
MD-243	P	SB	SHIPYARD CREEK BETWEEN MARKER #6 AND MCALLOY DOCK
MD-047	P	SB	TOWN CREEK (W SIDE OF DRUM ISL) UNDER GRACE MEM. BRIDGE
MD-046	P	SB	COOPER RIVER UNDER GRACE MEMORIAL BRIDGE

Cooper River - The reduction in freshwater input to the river due to the Cooper River Rediversion Project (1985) has resulted in changes in the hydrologic characteristics of the river and may be responsible in part for some of the long term changes observed in water quality parameters. The Cooper River has been treated annually in the past 10 years with aquatic herbicides in an attempt to control the growth of aquatic macrophytes. The plants need to be reduced in high use areas and trails need to be accessed from the ricefields to open water.

There are six SCDHEC ambient monitoring network sites along this section of the Cooper River. At the furthest upstream site (**MD-043**), aquatic life uses are fully supported; however there is a significant decreasing trend in dissolved oxygen concentration and a significant increasing trend in turbidity. There is no significant trend in dissolved oxygen concentration when only post-rediversion data (1986-1998) are considered. Significant decreasing trends in five-day biochemical oxygen demand, total phosphorus concentrations, and total nitrogen concentrations suggest improving conditions for these parameters. In sediments, high concentrations of chromium, lead, and nickel were detected in the 1995 sample, and very high concentrations of cadmium, chromium, and lead were detected in the 1998 sample. The lead concentration in 1995 and the cadmium concentration in 1998 exceeded the Effects Range Low (ERL) concentration, but was less than the Effects Range Median (ERM) concentration. Recreational uses are fully supported.

Further downstream (**MD-044**), aquatic life uses are also fully supported; however there is a significant decreasing trend in dissolved oxygen concentration and a significant increasing trend in turbidity. There is no significant trend in dissolved oxygen concentration when only post-rediversion data (1986-1998) are considered. There is also a significant decreasing trend in pH. Significant decreasing trends in five-day biochemical oxygen demand and total nitrogen concentrations suggest improving conditions for these parameters. Recreational uses are fully supported.

Aquatic life uses are also fully supported at **MD-248**. This site has only been sampled since 1993, so there is no pre-rediversion data. There is a significant increasing trend in pH. Significant decreasing trends in five-day biochemical oxygen demand, total phosphorus concentrations, total nitrogen concentrations, and turbidity suggest improving conditions for these parameters. In the 1994 sediment sample, very high concentrations of chromium, lead, nickel, and zinc were measured, together with a high concentration of copper, and the detection of flouranthene, PCB-1248, and PCB-1260. Chromium, copper, and nickel concentrations exceeded the Effects Range Low (ERL) concentration, but were less than the Effects Range Median (ERM) concentration, and the lead and zinc concentrations exceeded the ERL and ERM. Also in sediments, di-n-butylphthalate was detected in the 1995 sample and P,P DDE (a metabolite of DDT) was detected in the 1997 sample at a concentration that exceeded the ERL, but was less than the ERM. Although the use of DDT was banned in 1973, it is very persistent in the environment. Recreational uses are fully supported at this site, and a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter.

Further downstream at **MD-045**, aquatic life uses are also fully supported; however there is a significant decreasing trend in dissolved oxygen concentration and a significant increasing trend in turbidity. There is no significant trend in dissolved oxygen concentration when only post-rediversion data (1986-1998) are considered. There is also a significant decreasing trend in pH. Significant decreasing trends in five-day biochemical oxygen demand and total nitrogen concentrations suggest improving conditions for these parameters. In sediment, dieldrin was detected in the 1994 sample at a concentration that exceeded the Effects Range Low (ERL) concentration and the Effects Range Median

(ERM) concentration. Recreational uses are fully supported and a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter.

Aquatic life uses are fully supported at **MD-047**; however there is a significant decreasing trend in dissolved oxygen concentration. There is no significant trend in dissolved oxygen concentration when only post-rediversion data (1986-1998) are considered. There is also a significant decreasing trend in pH. A significant decreasing trend in total nitrogen concentrations suggests improving conditions for this parameter. Recreational uses are fully supported.

Aquatic life uses are also fully supported at the furthest downstream site (**MD-046**); however there is a significant decreasing trend in dissolved oxygen concentration and a significant increasing trend in turbidity. There is no significant trend in dissolved oxygen concentration when only post-rediversion data (1986-1998) are considered. There is also a significant decreasing trend in pH. Significant decreasing trends in five-day biochemical oxygen demand and total nitrogen concentrations suggest improving conditions for these parameters. Recreational uses are fully supported.

Shipyards Creek (MD-243) - Aquatic life uses are not supported due to sediment contamination and a shellfish consumption ban pertaining to tissue contaminant burden. A high concentration of zinc was measured in the 1994 sediment sample. In the 1995 sediment sample, very high concentrations of chromium, copper, lead, and zinc were measured, together with the detection of chrysene, fluoranthene, pyrene, bis(2-ethylhexyl)phthalate, di-n-butylphthalate, benzo(b)fluoranthene, P,P DDT, and P,P DDE. Copper, lead, and P,P DDE concentrations exceeded the Effects Range Low (ERL) concentration, but were less than the Effects Range Median (ERM) concentration. Zinc and P,P DDT concentrations exceeded both the ERL and the ERM. In the 1996 sediment sample, very high concentrations of chromium and zinc, and high concentrations of copper, lead, and nickel were measured, together with the detection of fluoranthene, pyrene, and P,P DDT. Chromium, copper, and lead concentrations exceeded the ERL concentration, but were less than the ERM concentration, and the P,P DDT concentration exceeded the ERL and the ERM. In the 1997 sediment sample, high concentrations of chromium, nickel, and zinc were measured, together with the detection of benzo(a)pyrene, anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, pyrene, benzo(a)anthracene, and P,P DDE. Lead, benzo(a)pyrene, chrysene, fluoranthene, pyrene, benzo(a)anthracene, and P,P DDE exceeded the ERL concentrations, but were less than the ERM concentration. Anthracene was detected at a concentration that exceeded both the ERL and ERM. In the 1998 sediment sample, a very high concentration of chromium and high concentrations of copper, nickel, and zinc were measured, together with the detection of P,P DDD and P,P DDE. Copper and P,P DDD concentrations exceeded the ERL concentration, but were less than the ERM concentration. Significant increasing trends in dissolved oxygen concentration and significant decreasing trends in five-day biochemical oxygen demand and total phosphorus concentrations suggest improving conditions for these parameters. Recreational uses are fully supported and a significant decreasing trend in fecal coliform bacteria concentration suggests improving conditions for this parameter.

Filbin Creek (MD-249) - Aquatic life uses are fully supported. There is a significant increasing trend in pH. Recreational uses are not supported due to fecal coliform bacteria excursions.

A fish consumption advisory has been issued by the Department for mercury and includes the Cooper River and Shipyard Creek within this watershed (see advisory p.62).

NPDES Program

Active NPDES Facilities

<i>RECEIVING STREAM FACILITY NAME PERMITTED FLOW @ PIPE (MGD) COMMENT</i>	<i>NPDES# TYPE LIMITATION</i>
COOPER RIVER WESTVACO CORP/CHAS. MILL PIPE #: 001 FLOW: 22.9 PIPE #: 002 FLOW: 6.4	SC0001759 MAJOR INDUSTRIAL EFFLUENT EFFLUENT
COOPER RIVER AMERADA HESS/VIRGINIA AVE. N. PIPE #: 001 FLOW: 0.053 PIPE #: 002 FLOW: M/R	SC0002852 MINOR INDUSTRIAL EFFLUENT
COOPER RIVER AMERADA HESS/VIRGINIA AVE. S. PIPE #: 001,002 FLOW: M/R	SC0002861 MINOR INDUSTRIAL EFFLUENT
COOPER RIVER ALLIED TERMINALS/CHAS. PIPE #: 001 FLOW: M/R	SC0001350 MINOR INDUSTRIAL EFFLUENT
COOPER RIVER EQUILON ENTERPRIZES/CHAS. PIPE #: 001 FLOW: 0.055	SC0003026 MINOR INDUSTRIAL EFFLUENT
COOPER RIVER BAYER CORP./BUSHY PARK PLT. PIPE #: 001 FLOW: 4.889 PIPE #: 001A,002 FLOW: M/R WQL FOR NH3-N, BOD5	SC0003441 MAJOR INDUSTRIAL WATER QUALITY
COOPER RIVER KOCH REFINING CO. PIPE #: 001 FLOW: 0.0812 PIPE #: 002 FLOW: M/R	SC0003794 MINOR INDUSTRIAL EFFLUENT
COOPER RIVER US NAVY/CHARLESTON NAVAL SHIPYARD PIPE #: 002,004,009,010,011 FLOW: M/R (PERMIT INACTIVATED)	SC0003816 MINOR INDUSTRIAL EFFLUENT
COOPER RIVER US NAVY/WEAPONS STATION	SC0021385 MINOR INDUSTRIAL

PIPE #: 001 FLOW: 0.056	EFFLUENT
COOPER RIVER US NAVY/WEAPONS STATION PIPE #: 001,002,003 FLOW: M/R	SC0043206 MINOR INDUSTRIAL EFFLUENT
COOPER RIVER RM ENGINEERED PRODUCTS PIPE #: 001 FLOW: 0.223	SC0003875 MINOR INDUSTRIAL EFFLUENT
COOPER RIVER N.CHAS.SWR.DIST./FELIX DAVIS WWTP PIPE #: 001 FLOW: 27.0 WQL FOR BOD5, DO	SC0024783 MAJOR DOMESTIC WATER QUALITY
COOPER RIVER E.I. DUPONT/COOPER RIVER PLT. PIPE #: 001 FLOW: 1.322 WQL FOR BOD5	SC0026506 MAJOR INDUSTRIAL WATER QUALITY
COOPER RIVER JACOBS APPLIED TECHNOLOGY, INC. PIPE #: 001 FLOW: 0.015	SC0027502 MINOR INDUSTRIAL EFFLUENT
COOPER RIVER AMOCO CHEMICALS/COOPER RIVER PIPE #: 001 FLOW: 2.33	SC0028584 MAJOR INDUSTRIAL EFFLUENT
COOPER RIVER BCW&SA/LOWER BERKELEY WWTP PIPE #: 001 FLOW: 15.0 WQL FOR DO	SC0046060 MAJOR DOMESTIC WATER QUALITY
COOPER RIVER CHARLESTON SHIPBUILDERS, INC. PIPE #: 001 FLOW: M/R (PERMIT INACTIVATED)	SC0047708 MINOR INDUSTRIAL EFFLUENT
COOPER RIVER DETYENS SHIPYARDS/DRYDOCK#5 PIPE #: 001 FLOW: M/R (NOT MAPPED)	SC0047481 MINOR INDUSTRIAL EFFLUENT
COOPER RIVER NUCOR STEEL/BERKELEY PLT PIPE #: 001-003 FLOW: M/R WQL FOR DO	SC0047392 MAJOR INDUSTRIAL WATER QUALITY
COOPER RIVER TRIBUTARY MT PLEASANT WATER PLANT #2 PIPE #: 001 FLOW: M/R	SC0043273 MINOR DOMESTIC EFFLUENT
COOPER RIVER TRIBUTARY EVENING POST PUBLISHING CO. PIPE #: 001 FLOW: M/R	SCG250040 MINOR INDUSTRIAL EFFLUENT

TIDAL CREEK TO COOPER RIVER
 CHARLESTON CPW/DANIEL ISLAND
 PIPE #: 001 FLOW: 0.5
 WQL FOR TRC,DO,NH₃-N,BOD₅

SC0047074 (Not Mapped)
 MINOR DOMESTIC
 WATER QUALITY

TIDAL CREEK TO COOPER RIVER
 SCE&G/WILLIAMS STATION
 PIPE #: 001-005 FLOW: M/R

SC0003883
 MAJOR INDUSTRIAL
 EFFLUENT

FILBIN CREEK
 DEFENSE FUEL SUPPORT PT/CHAS.
 PIPE #: 001,002 FLOW: M/R

SC0021997
 MINOR INDUSTRIAL
 EFFLUENT

FILBIN CREEK
 WESTVACO CORP/CHAS.

SC0001759
 MAJOR INDUSTRIAL

PIPE #: 004 FLOW: 5.0

EFFLUENT

FILBIN CREEK
 MARATHON ASHLAND/N. CHAS.
 PIPE #: 001 FLOW: M/R

SC0034134
 MINOR INDUSTRIAL
 EFFLUENT

SHIPYARD CREEK
 CHEVRON PRODUCTS/CHAS.
 PIPE #: 001,001A FLOW: M/R

SC0001023
 MINOR INDUSTRIAL
 EFFLUENT

SHIPYARD CREEK
 MACALLOY CORPORATION
 PIPE #: 001,002,004 FLOW: M/R
 PIPE #: 003 FLOW: 0.013

SC0004014
 MINOR INDUSTRIAL
 EFFLUENT

SHIPYARD CREEK
 KINDER MORGAN BULK TERM.
 PIPE #: 001 FLOW: M/R

SC0048046 (NOT MAPPED)
 MINOR INDUSTRIAL
 EFFLUENT

SHIPYARD CREEK
 FOSTER WHEELER RESOURCE RECOV.
 PIPE #: 001-004 FLOW: M/R

SC0041173
 MINOR INDUSTRIAL
 EFFLUENT

Nonpoint Source Management Program

Mining Activities

MINING COMPANY
MINE NAME

PERMIT #
MINERAL

OL THOMPSON CONSTR. CO., INC.
 PRIMUS TRACT

0962-15
 SAND/CLAY

Land Disposal Activities

Landfill Facilities

SOLID WASTE LANDFILL NAME
FACILITY TYPE

PERMIT #
STATUS

WESTVACO LANDFILL
 INDUSTRIAL

IWP-177, IWP-090, IWP-150

CHARLESTON/SPRUIL AVE. DUMP MUNICIPAL	----- CLOSED
GASTON DUMP MUNICIPAL	----- CLOSED
HOLSTON LANDFILL MUNICIPAL	DWP-003 NEVER OPENED
ROMEY STREET LANDFILL MUNICIPAL	DWP-079, DWP-061 CLOSED

Groundwater Contamination

The groundwater in the vicinity of the surface dust impoundment owned by MacAlloy Corporation (#00274) is contaminated with chromium. The facility is currently in the remediation phase, and a dust impoundment closure and further site assessment is managed by RCRA and EPA. The surface water affected by the groundwater contamination is Shipyard Creek.

The groundwater in the vicinity of the property (#00785) owned by Foster Wheeler (formerly Charleston Resource Recovery) is contaminated with volatile organics from an unknown source. The full impact is being assessed with new monitoring wells. The surface water affected by the groundwater contamination is Shipyard Creek.

Also affecting a tributary of Shipyard Creek is groundwater in the vicinity of the property owned by WR Grace & Co. (SCD003343191), which is contaminated with pesticides and herbicides from unpermitted disposal. The assessment is complete and a treatability study is in progress.

A source of contamination to the Cooper River is the groundwater contaminated with metals and organic compounds as a result of unpermitted disposal by the previous owners (SCE&G, City of Charleston, and City of Charleston Housing Authority) of the land now owned by the National Park Service (#SCD987572674). Construction of the New Charleston Marina is now in progress.

Also affecting the Cooper River is groundwater in the vicinity of the property owned by Calhoun Park/Ansonborough Homes (SCD987581337), which is contaminated with organic compounds from unpermitted disposal. The facility is in the remedial alternative selection and design phase.

Water Supply

<i>WATER USER (TYPE) STREAM</i>	<i>REGULATED CAPACITY (MGD) PUMPING CAPACITY (MGD)</i>
WR GRACE & CO. (I) COOPER RIVER	0.432 -----

Growth Potential

The Union Terminal (Sea Port Facility) within the City of Charleston is projected to be an area of population growth. The population in the urban areas west of the Cooper River have declined in the last decade and are not expected to grow in the near future. The U.S. Navy Base/Shipyard was closed by the Navy in 1996. The Office/Manufacturing/Industrial reuses of this property will occur well into the future, but residential uses are not significant components of the Base Reuse Plan. The Bushy Industrial Park, which includes several very large industries, is also located in this watershed, and should continue to encourage industrial growth.

Watershed Protection and Restoration

Special Models

The Charleston Harbor Models

Two different models have been developed for wasteload allocations purposes for the Charleston Harbor system. The initial model was developed through the Charleston Harbor Project (CHP) and the second model was developed by Applied Technologies and Management (ATM) for the Cooper River Water Users Association. Working in conjunction with the Department, the University of South Carolina, Clemson University, and the United States Geological Survey (USGS), CHP's goal was to develop a tool for the Department's use in point source wasteload allocation and Total Maximum Daily Load (TMDL) determination. The modeled domain, for both models, encompasses the Cooper River and its major tributaries from Pinopolis Dam to its confluence with the Wando River, the Wando River from its headwaters to the confluence with the Cooper River, and the Ashley River from Bacon Bridge downstream to the U.S. Hwy. 17 Bridge. Hydrodynamics, for CHP's effort, are modeled using the one-dimensional BRANCH model while water quality is modeled using the one-dimensional Branched Lagrangian Transport Model. Modeling data were collected in May and August of 1993 by the Department and the USGS. Hydrodynamics, for ATM's effort, are modeled using the two-dimensional boundary fitted circulation model. Water quality is modeled using the two dimensional WQMAP which uses EPA WASP5 eutrophication model kinetics. Modeling data were collected in September 1996 by ATM and August of 1993 by the Department and the USGS. The Department plans on using the two models in concert to determine TMDL and point source wasteload allocations for the Charleston Harbor system.